11th Grade Assignment – Week #7

Individual Work

- Do **Problem Sets #3 and #4** from the unit **Trigonometry – Part II.**

Group Assignment:

For Tuesday.

1) What is the probability of rolling at least one 1 when rolling two dice?
2) Play several rounds of the *Guessing Game* (as explained in the lecture). Then thoroughly discuss the following question: What is the best strategy in order to maximize your average score per game? Remember that in this case we aren't really concerned about beating anyone that we happen to be playing against, but rather, imagine that you are playing one million rounds without any opponent. What would be your best strategy in order to maximize your averge score per round?

For Thursday.

3) Considering the hints I gave in yesterday's lecture, try now to calculate the "threshold value" for the best *Guessing Game* strategy.
4) (If you still have extra time.) A triangle with sides of 13, 14, 15 has an area of 84. (You can use Heron's formula to calculate this.) What are the three angles of this triangle?

Problem Set #3

1) For each problem, give a decimal estimate, then use your calculator to check it.

a) $\cos(40°)$

b) $\tan(77°)$

c) $\tan(40°)$

d) $\cos(5°)$

e) $\tan(5°)$

f) $\sin(5°)$

g) $\cos(85°)$

h) $\tan(85°)$

i) $\sin(85°)$

j) $\sin(95°)$

k) $\sin(120°)$

2) Given each fact, calculate the other two trig functions of the same angle. (Without the trig buttons of your calculator.)

a) $\sin(27°) \approx 0.454$

b) $\cos(86°) \approx 0.070$

c) $\tan(13°) \approx 0.231$

3) If $\alpha + \beta = 90°$, then what general law or formula expresses the relationship between $\tan(\alpha)$ and $\tan(\beta)$?

Finding the Angle.

If we were asked "what is the cosine of 60°", we know the answer would be ½. But what if things were reversed, and we were asked, "For what angle is the cosine equal to ½?" This question is written like this:

$\cos^{-1}(½)$ or $\arccos(½)$

and is called the *inverse cosine*.

Note: In the rest of this unit, $\sin^{-1}$ normally has two answers (that add to 180°), and $\cos^{-1}$ and $\tan^{-1}$ have one answer, θ, where $0° \le \theta \le 90°$.

4) Without a calculator, find the value of θ.

a) $\theta = \sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$

b) $\theta = \cos^{-1}(½)$

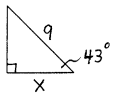
c) $\theta = \tan^{-1}(1)$

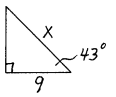
d) $\theta = \sin^{-1}(1)$

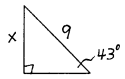
e) $\theta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

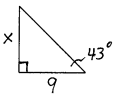
f) $\theta = \tan^{-1}(\sqrt{3})$

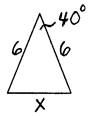
5) Find the variable indicated.

a) 

b) 

c) 

d) 

e) 

6) Find all the missing sides and angles.

7) Have someone test you to see that you have memorized the values for the *Basic Trig Facts* (as given on problem #1 from Problem Set #1.)

Problem Set #4

1) For each problem, give a decimal estimate, then use your calculator to check it.

a) $\cos(70°)$ g) $\tan(48°)$

b) $\sin(70°)$ h) $\cos(35°)$

c) $\tan(70°)$ i) $\tan(44°)$

d) $\cos(20°)$ j) $\sin(135°)$

e) $\sin(20°)$ k) $\sin(150°)$

f) $\tan(20°)$ l) $\sin(180°)$

2) Given each fact, calculate the other two trig functions of the same angle. (Without the trig buttons of your calculator.)

a) $\sin(58°) \approx 0.848$

b) $\cos(14°) \approx 0.970$

c) $\tan(49°) \approx 1.15$

3) Give a formula, only expressed in terms of $\cos\theta$, for…

a) $\sin\theta$

b) $\tan\theta$

4) With each problem…

- Sketch the specified triangle.
- Give a decimal estimate of the answer to the problem (which should be an angle).
- Use a calculator to check your answer.
- Remember that $\sin^{-1}$ normally has two answers.

a) $\sin^{-1}(0.25)$

b) $\cos^{-1}(0.9)$

c) $\sin^{-1}(0.65)$

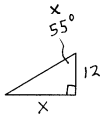
d) $\cos^{-1}(0.65)$

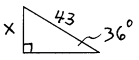
e) $\tan^{-1}(0.5)$

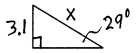
f) $\tan^{-1}(2)$

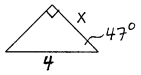
5) Find the variable indicated. (With the last two, you should use the *Law of Sines*!)

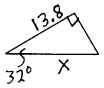
a) 

b) 

c) 

d) 

e) 

f) 

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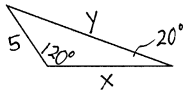
h) 

6) The Eiffel Tower in Paris is 320m tall. What is the length of its shadow (as measured from the center of its base) if the sun has an angle of elevation of 28° (i.e., the sun is 28° above the horizon)?

7) Have someone test you (once again!) to see that you have memorized the values for the *Basic Trig Facts* (see Problem Set #1, problem #1.)